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US Army Corps of Engineers®
Engineer Research and Development Center

Coastal Inlets Research Program

Inlet Geomorphology Evolution

Description

The Inlet Geomorphology Evolution work unit of the CIRP evaluates federal navigation and coastal projects over time scales much greater than dredging cycles, planning timelines, and the dimensions of the navigation channel. The present focus of the work unit is directed towards developing guidance for placement of sediment in the nearshore, which is a common alternative considered for placement of dredged sand and mixed sediments in the nearshore area adjacent to inlets. However, there is little guidance available for design and anticipated temporal and spatial scales of evolution. In addition, there are environmental concerns about transport and burial of fines over sensitive submerged aquatic habitat areas. Present primary activities are directed towards addressing these nearshore placement challenges. Additional activates address application of the Coastal Modeling System to long-term evolution at inlets and the development of a sediment sampling database.

Issue Addressed

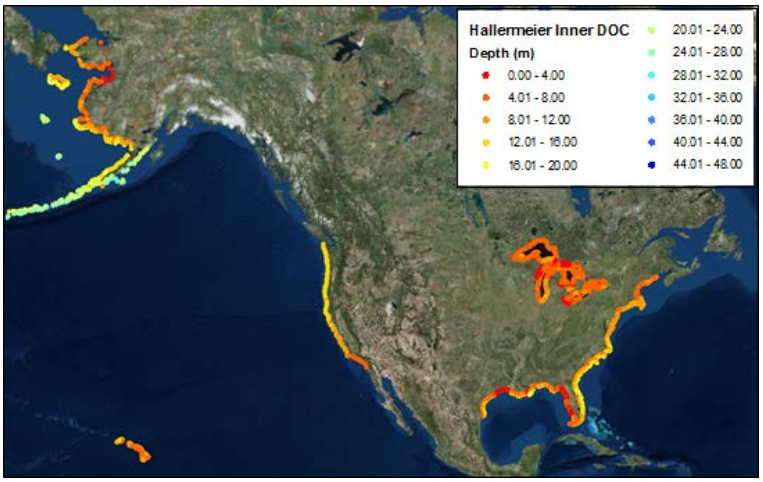
The greatest nearshore placement challenges identified are the need to (a) develop guidance for siting of placement options, (b) evaluate the temporal and spatial scales of sediment movement from the placement site, and (c) predict the final morphologic response.

Products

Three nearshore placement projects have been monitored and their responses documented in a series of technical notes, technical reports, and journal articles. Ongoing work is directed towards using the knowledge gained through these monitoring projects to develop simplified calculation tools and success-based descriptors for evaluating nearshore placement alternatives. Methods and procedures will be outlined that integrate the use of web apps, and look-up tables and figures will be developed to help engineers and

Perdido Key Florida's swash zone berm during dredge material placement operations.

managers determine the volumes of the grain sizes included in the placed material and estimate what portion of these volumes are likely to move from the placement area. The work unit will also investigate the relationships of what portion of the nearshore are likely to benefit from the grain size related volumes thereby aiding in the evaluation of the benefits afforded by the nearshore placement. In out years, time scales of the material movement will be addressed. Presently, depth of closure lookup figures and a database have been completed and are being incorporated into a web application.



Depth of closure estimated for United States shorelines.

The depth of closure database can be viewed at http://cirp.usace.army.mil/products/depth-of-closure.php. Sediment Analysis GeoApp (SAGA) is being developed and populated with digital and paper sedimentology data. SAGA can be viewed at http://geoplatform.usace.army.mil/home/. Science based workshops have been conducted and monitoring of several pilot nearshore berm projects have been completed.

Application of Products

Depths of Closure lookup up tables and maps and the SAGA webapp have been used by SAJ, SAW, SAS, SWG, and state agencies.

Projected Benefits

This information will allow managers to develop plans for placement of sediment in the nearshore and evaluate the likely long-term evolution, estimate benefits of the placement in reducing wave impacts on the subaerial beach and/or migrating onshore, and answer resource agencies questions. Procedures and tools developed in this work unit can be included in future software to simplify nearshore berm design, placement, and evaluation. Additionally the work unit will redefine the transport zone and present concepts of success-based descriptors for nearshore berms to better communicate and evaluate the expected behavior and benefits of nearshore placement.

Documentation

Nearshore placement studies have been documented in two journal papers, one technical report, and four Coastal and Hydraulics Engineering technical notes (CHETN), and two draft CHETNs, one thesis and one dissertation, as documented on the CIRP website: http://cirp.usace.army.mil/ .

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CIRP Website

- Please see the CIRP website to download documentation: http://www.erdc.usace.army.mil/Missions/WaterResources/CIRP/Publications.aspx
- View archived webinars: http://www.erdc.usace.army.mil/Missions/WaterResources/CIRP/TechTransfer.aspx and
- Review guidance documented on the CIRP wiki: http://cirpwiki.info/wiki/Main_Page .